State Level Combined Heat and Power (CHP/DG) Funding & Support

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New York State Energy Research and Development Authority

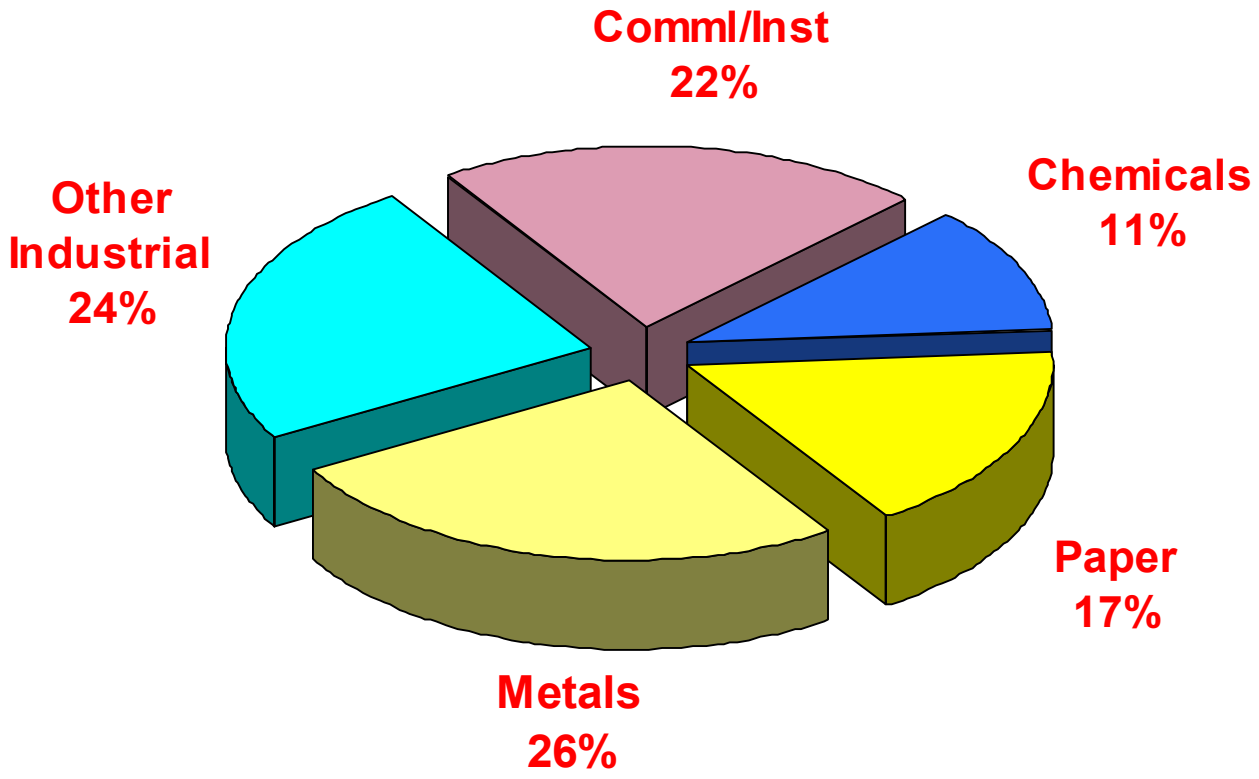
Albany, New York

New York State Energy Research and Development Authority (NYSERDA)

- A Public Benefit Corp established in 1975 by State Legislature
- Mission: To identify solutions to State's energy challenges in ways that benefit the State's economy and environment
- Forge public/private partnerships with businesses, municipalities, residents, and other energy stakeholders to accomplish this goal.

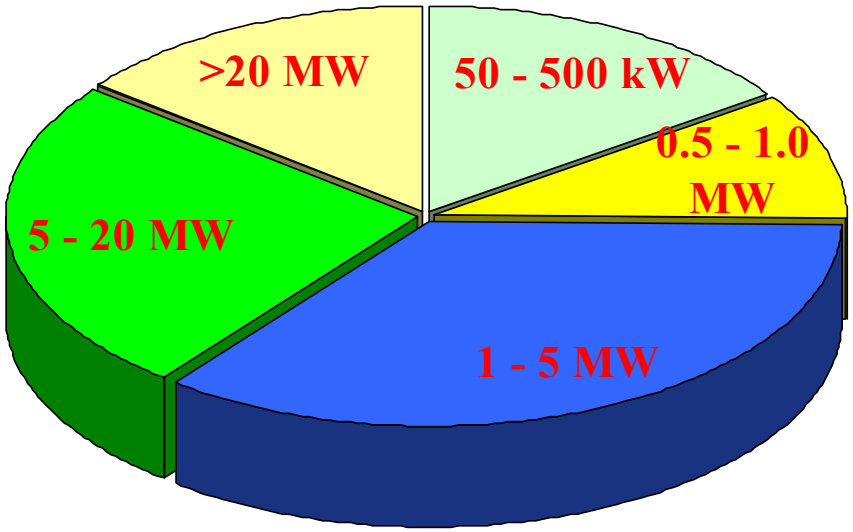
New York's Existing CHP Capacity: 5,070 MW

Industrials Represent 78% of Existing CHP in New York

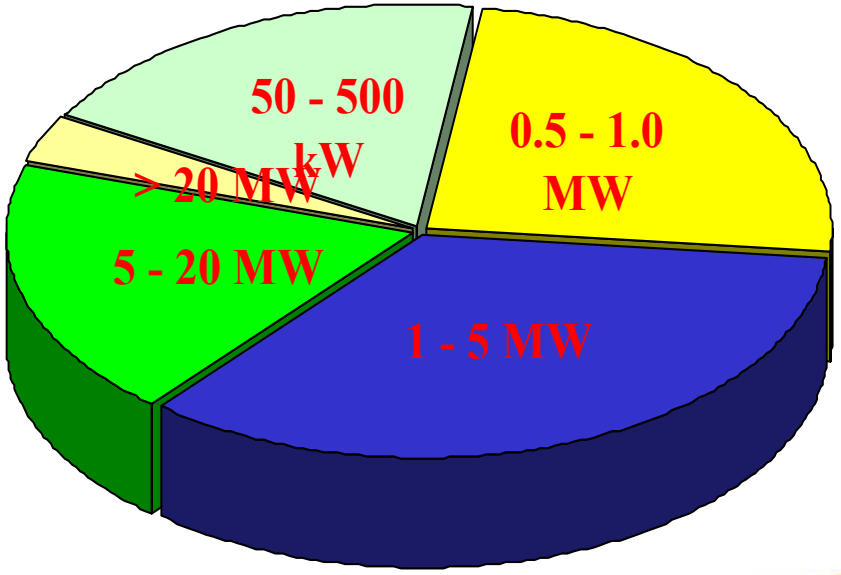


New York's CHP Technical Potential 8,477 MW (Thermal Demand Sized)

Industrial Potential: 1948 MW
60% is in Systems Below 5 MW



Commercial/Inst. Potential: 6529 MW
78% is in Systems Below 5 MW



Source: Energy Nexus Group

Cumulative CHP Market Penetration Projection by 2012 (MW)

CHP System Size	Business As Usual	Accelerated
50 to 500 kW	0	61
500 kW to 1 MW	92	331
1 MW to 5 MW	204	699
5 MW to 20 MW	208	704
> 20 MW	260	374
Total	764	2,169

CHP Benefits At Full Market Penetration

CHP Benefits	Business As Usual	Accelerated
Economic Savings ($ million)		
2012 Annual	$109	$487
Cumulative (02-12)	$536	$1,825
Net Present Value	$253	$808
Energy Savings (trillion Btu)		
2012 Annual	25	74
Cumulative (02-12)	118	316
Annual Emissions Savings After 2012(tons/year)		
NOx	3,210	10,282
CO2	1,259,000	3,854,000
SO2	9,778	27,766

New York's CHP (/DG) Incentives

- $15 Million SBC Funds through NYSERDA
- Standby Service Rates: CHP Exemptions and Phase-ins
- Std. Interconnection Requirements Established
- Electric Utility DG Pilot Program Grid Upgrade vs. DG
- DG Gas Distribution Prices + Gas Utility DG Programs\
- State Education Dept Funding for K-12 Schools
- NYC EDC – Energy Cost Savings Program
- Emissions Reduction Credits (in development)

NYSERDA's DG-CHP Program

- Develop & Demonstrate Innovative DG Technologies & CHP Applications
- Support site-specific and sector wide feasibility studies and replication
- Monitor Performance and Reduce Hurdles through Shared Knowledge – NYS CHP Conf. June 24-25, 2004
- Install Megawatts of Generation Capacity
- Funding: Cost share of 30 – 60% of Project cost subject to a cap of $1 million per project

Other States with SBC-like Funds & DG/CHP Interest

- California – Self-Generation Incentive Program and California Energy Commission's DG Programs
- New Jersey – DG-CHP Incentive Programs (in Development)
- Massachusetts – Renewables Incentives, Mass Tech Initiatives
- Connecticut – Support for Fuel Cells, Connecticut Clean Energy Fund
- Others?…..

California's Self-Gen Program

Eligible Technology	Incentive	Max % of Project Cost	System Size
LEVEL 1 Photovoltaic, Fuel cells operating on renewable fuels, Wind turbines	$4,500 per kW	50%	30 – 1500 kW
LEVEL 2 Fuel cells operating on non-renewable fuel and utilizing waste heat recovery	$2,500 per kW	40%	Up to 1500 kW
LEVEL 3-R Micro-turbines, internal combustion engines and small gas turbines operating on renewable fuel	$1,500 per kW	40%	Up to 1500 kW
LEVEL 3-N Micro-turbines, internal combustion engines and small gas turbines operating on non-renewable fuel, utilizing waste heat recovery and meeting the reliability criteria	$1,000 per kW	30%	Up to 1500 kW

Comparison of NY & CA Programs

Item	NY	CA
Program Basics	Solicitation based Demo program. Offers cost-share. State administered.	Subscription based deployment program. Offers $/kW with technology biases. Utility admin.
Support	Strong PSC support, utility DG pilot programs, standby rate exemptions and phase-ins, SIR, and technical project management,	Good synergy between CEC and Self-Gen programs, active utility involvement, supportive tariff structure.
Major Hurdles	Utility buy-in, interconnection delays, cost, unclear emission regs., unsupported replication.	Stringent emissions regs, costs, time-delays
Metrics	3 year data requirements, technology transfer, and performance monitoring	MW installed, cost-effectiveness, replication
Outcome to date	$40 million committed for 80 projects, 20 in operation, all end-use sectors and all technologies represented.	$216 million committed, a number of fuel-based systems in operation, time delays between commitment and commissioning.

New Jersey's CHP Incentive Program

Eligible Technology	Incentive ($/Watt) Limit: 1.0 MW	Maximum % of Project Cost
Level 1: Fuel cells on non-renewable fuel	2.50	40
Level 2: Microturbines, IC Engines, Gas Turbines	1.00	30 or 40 w. Cooling
Level 3: Heat or mechanical recovery from existing equipment using new electric generation	0.50	30

Requires 5 year service warranty and/or 5 year service contract
Funding of $4 million per year, To be available Summer '04

NYSERDA's DG-CHP Demonstration Program Installations (kW)

Technology	No. of Projects	Total Capacity	Typical Size
Engines	54	56,714	1,000
Turbines (Gas/Steam)	7	26,309	3,000
Microturbines	13	1,500	120
Fuel Cells	7 (10 sites)	4,050	200
Hybrids	4	4,598	1,000
Totals	84	93,171	1,000

NYSERDA's Fuel Cell Demonstrations

Type	Application	Capacity	NYSERDA $	Comments
PAFC	Municipal WWT	1.6 MW	$1,000,000	8 fuel cells @ 4 Sites
PAFC	Bronx Zoo	200 kW	$584,030	WCS
PAFC	East Rochester K-12	200 kW	$833,430	ATSI Engineering
PAFC	Verizon - TeleCom.	1.4 MW	$425,000	7 fuel cells + Engines
MOFC	Sheraton Hotel	250 kW	$920,000	PPL
MOFC	Syracuse Univ-ESF	250 kW	$1,000,000	EO111
PEM	Albany NanoTech	150 kW	$614,250	UTC
PEM	Various Product Demos			Power Systems Program
SOFC	Verizon – Rome	250 kW	$1,000,000	Terminated – Unavail
PAFC	Multi-family	200 kW	$600,000	Terminated - Uneconomic

Fuel Cells at WWTP in NYC

- Eight UTC PAFC Fuel Cells at Four Municipal Waste Water Treatment Facilities in New York City (NYCDEP)
- Heat Recovered to Support Anearobic Digester
- Reduced On-site Emissions by Eliminating Flare
- NYSERDA: $1,000,000; NYPA: $12,000,000
- Four currently Operational.

SUNY Buffalo/Grester Trane

- Two 60 kW Capstones
- Peak Reduction: 300 kW
- Application: Swimming Pool
  - **Power to water pumps**
  - **Heat to electric water heaters**
- Funding: NYSERDA: $310000 + SUNY & Grester Trane: $310,000
- Status: Currently Operational
- Savings: 2000 MWh/yr, $73,000 per year

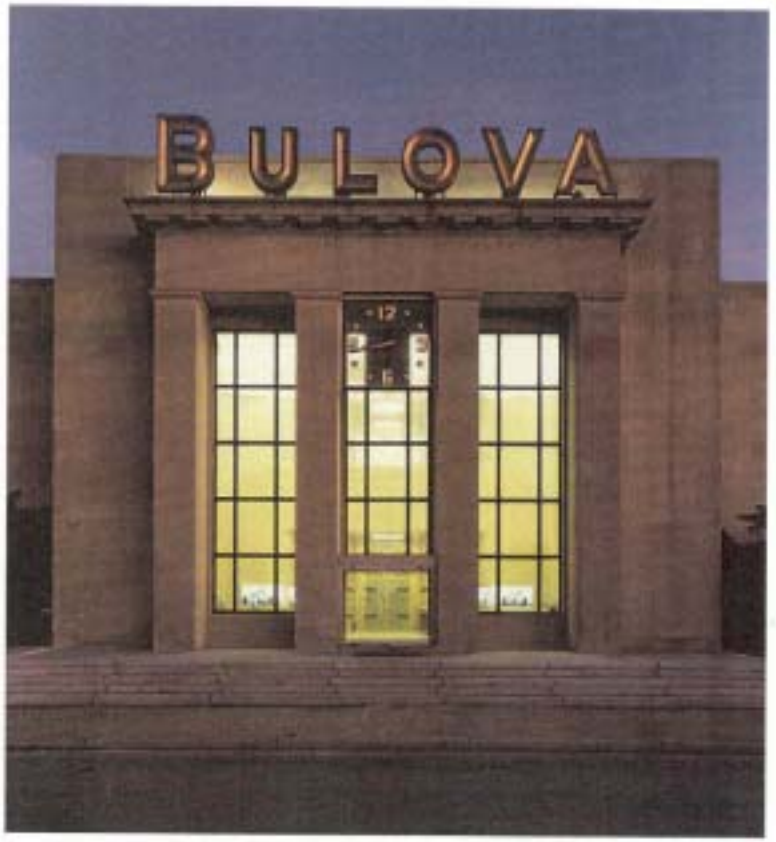
NYSERDA

Waldbaums Supermarket

- Utilizes one Capstone microturbine.
- Utilizing a 40-ton Absorption Chiller.
- Annual energy savings of over $50,000.
- Good opportunity for technology transfer.

Bulova @ LaGuardia Airport

- Building has been converted from the headquarters of Bulova Watch Co. to a state of the art office building.
- Utilizing (2) 350-ton gas engine driven chillers.
- Peak Demand Reduction of 526 kW
- Excellent thermal efficiency.



Greater Rochester International Airport

- Two 750 kW Natural gas Recip. engines
- Heat recovered for space and DHW heating and a 300 ton absorber
- NYSERDA: $500,000; GRIA $2,000,000
- Status: Fully Operational.

Oakwood Healthcare Center

- Islanded application – Three Recip engines (2 NG, 1 Diesel), 850 kW
- Heat recovery: space heating and DHW
- Integrated with load management strategies (Ex: thermal storage)
- Funding: NYSERDA: $425,000 Oakwood: $563,000
- Status: fully operational.

DG-CHP Challenges

- Regional CHP Activity - Lack of similar CHP (/DG) interest among various states
- Standby Rates - NYS PSC developed standby tariffs with CHP exemptions and phase-ins, other states like MA are in the process of developing tariffs
- Emissions Standard - NYS DEC is in the process of developing air emissions standards. Others ?
- Interconnection – MA has set a SIR, NYS is in the process of updating its SIR to 1 MW and to networks
- Utility Buy-In - Grid support, congestion mitigation, alternative to grid expansion/upgrade, utility ownership or access to excess capacity

DG Standby Rates - Context

- Revenue Neutrality – Stranded costs (/CTCs), Cost allocation (shared, local), loss of load (back-up options), etc.
- Public Benefit – Energy -Efficiency, -Security, -Availability, and the Environment
- Economic Development – Energy costs, fuel diversity, business and technology development, etc.

New York's CHP Program Summary

- Supporting 80 demo projects, 20 feasibility studies, and 10 technology/programmatic studies
  - NYSERDA funding of $45 million (in ~$140 M)
  - Demonstration projects will install 30 MW of capacity for a peak demand reduction of 26 MW in 2003
  - Additional capacity of 26 MW and 35 MW to be installed in '04 and '05, respectively
- CHP applications in industrial, agricultural, municipal, institutional, commercial, and residential sectors
- Field-Performance: Monitoring and Data Collection is Underway